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(54) MULTILAYERED SHEET AND CARD COMPRISING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a multilayered sheet excellent in emboss processability for reducing warpage in embossing and generating no crack in a stamped character, having excellent thermal fusibility in heat laminating and used in a card such as a magnetic card, an IC card, and also to provide the card comprising the same.

SOLUTION: At least one layer of the multilayered sheet is a sheet A comprising at least one kind of a thermoplastic resin selected from an amorphous polyester (A-1) and an aromatic polycarbonate (A-2), and at least another layer thereof is a sheet B comprising a biaxially oriented sheet whose average value of heat shrinkage factors measured when the sheet is heat-treated at 150°C for 30 min in three directions equally divided in the surface of the sheet is not more than 1%.

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CLAIMS

[Claim(s)]

[Claim 1] It is the multilayer sheet which comes to carry out the laminating of the sheet of two or more sheets. At least one of them It is the sheet A which consists of one sort or two sorts or more of thermoplastics chosen from amorphism polyester and (A-2) an aromatic series polycarbonate. (A-1) Moreover, the multilayer sheet characterized by being the sheet B with which the average of the rate of a heat shrink at the time of heat-treating 150 degrees C for 30 minutes in three directions which at least one layer divided equally in the sheet surface consists of a biaxial orientation sheet which is 1% or less.

[Claim 2] The multilayer sheet according to claim 1 with which said sheet A is characterized further (a-1) by coming to blend the inorganic tabular filler 0.5 whose mean particle diameter is 0.5-20 micrometers - 25 weight sections to a total of 100 weight sections of the thermoplastics in this sheet.

[Claim 3] The multilayer sheet according to claim 2 characterized by the aforementioned (a-1) component being one or more sorts chosen from talc and a kaolin.

[Claim 4] Claims 1-3 characterized by being amorphism polyester with which the aforementioned (A-1) amorphism polyester component consists of a dicarboxylic acid unit which is mainly concerned with a terephthalic-acid unit, and a glycol unit which is mainly concerned with ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit are the multilayer sheets of a publication either.

[Claim 5] The multilayer sheet according to claim 4 characterized by the mole ratio [(I)/(II)] of the ethylene glycol unit (I) in the aforementioned (A-1) amorphism polyester component and 1 and 4-cyclohexane dimethanol unit (II) being one or more.

[Claim 6] The mole ratio [(I)/(II)] of an ethylene glycol (A-1-1) unit (I) and 1 and 4-cyclohexane dimethanol unit (II) One or more amorphism polyester, [the thermoplastics which constitutes said sheet A] And (A-1-2) it is that with which the mole ratio [(I)/(II)]

of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) blended less than one amorphism polyester (A-1) and an aromatic series polycarbonate (A-2). Claims 1-3 characterized by a certain thing are the multilayer sheets of a publication either.

[Claim 7] an antenna circuit for said sheet B to send and receive a signal by the electromagnetic coupling or the electric wave on a sheet surface, and a conductor -- claims 1-6 characterized by forming a circuit -- either -- the multilayer sheet of a publication.

[Claim 8] Claims 1-7 characterized by the biaxial orientation sheet of Sheet B consisting of polyester are the multilayer sheets of a publication either.

[Claim 9] Claims 1-7 characterized by the biaxial orientation sheet of Sheet B consisting of polyethylene terephthalate are the multilayer sheets of a publication either.

[Claim 10] Claims 1-7 characterized by the biaxial orientation sheet of Sheet B being a polyethylene terephthalate sheet which formed the coat at least in the one side are the multilayer sheets of a publication either.

[Claim 11] The card characterized by becoming any 1 term of claims 1-10 from the multilayer sheet of a publication.

[Claim 12] The card according to claim 11 characterized by being a magnetic card or an IC card.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention has few amounts of curvatures at the time of embossing, it excels in the embossing nature of a crack not arising on a marking alphabetic character front face, hot melt adhesive is not used, but ** is also related with the card which consists of the multilayer sheet and it which are suitably used as cards, such as a magnetic card which is excellent in the thermal melting arrival nature at the time of a heating laminating, and an IC card.

[0002]

[Description of the Prior Art] In recent years, cards on which the notation, the alphabetic character, etc. were stamped in three dimensions by embossing, such as a magnetic card and an IC card, are used widely. As these card ingredients, a card curves by embossing, or it is needed for the marking alphabetic character front face for a crack not to arise, and, generally the multilayer sheet made of rigid-polyvinyl-chloride resin is used. However, the card ingredient which is except the product made of rigid-polyvinyl-chloride resin, and was excellent in embossing nature since the danger that polyvinyl chloride resin will generate the matter harmful to the body by making it burn was made into the problem has been demanded.

[0003] On the other hand, 1 and 4-cyclohexane dimethanol derivative copolymerized polyester is one of the resin with good embossing nature, and the expansion to a card application is considered. Moreover, how to raise thermal resistance has been considered by blending the polycarbonate resin which is the polymer which has high glass transition temperature in this. The sheet which becomes JP,10-100356,A from the blend object of a

polycarbonate and 1 and 4-cyclohexane dimethanol derivative copolymerized polyester for the purpose of easy-workability grant of being able to carry out thermal melting arrival at heat-resistant improvement and the practical temperature of 110-150 degrees C is indicated.

[0004] the card application using the sheet layered product represented with an IC card -- an antenna circuit and a conductor -- it puts with a sheet with functionality, such as the sheet which has the functionality of two sheets for the sheet with which circuits, such as a circuit, were formed from both sides, for example, above-mentioned embossing nature, and concealment nature, and considers as a laminated structure through hot melt adhesive etc., and this structure is cut out in required size and it is used, being formed in a card.

JP,11-254576,A -- an antenna circuit and a conductor -- although circuits, such as a circuit, are formed, the useful biaxial oriented film is indicated.

[0005] however -- if two sorts of such sheets are heated like hot melt adhesive and it pastes up -- whenever [stoving temperature] -- this -- since the heat shrink properties between two sorts of sheets differ mutually in many cases, distortion and smoothness get worse [the structure after a laminating], and the problem which causes a poor appearance, such as curl, actualizes. Moreover, since the coat of this glue line is needed, a process becomes complicated and cost also increases, the activity of hot melt adhesive is not desirable. Then, it was anxious for the ingredient which was excellent in embossing nature, and did not need hot melt adhesive but excelled [**] in thermal melting arrival nature as this charge of card lumber at the time of a heating laminating.

[0006]

[Problem(s) to be Solved by the Invention] This invention is attained as a result of considering solution of the trouble in the conventional technique mentioned above as a technical problem. The object of this invention It excels in the embossing nature of there being little curvature at the time of embossing, and a crack not arising to a marking alphabetic character again. And it is in offering the card which consists of the multilayer sheet and it which are suitably used as cards, such as a magnetic card which does not need hot melt adhesive but excels [**] in thermal melting arrival nature at the time of a heating laminating, and an IC card.

[0007]

[Means for Solving the Problem] Thermal melting arrival nature with a biaxial orientation sheet also discovers ** without hot melt adhesive to a surprising thing, and this invention persons came to complete header this invention for the ability of the above-mentioned object to be solved at once, when the sheet which consists of one sort or two sorts or more of thermoplastics chosen from amorphism polyester and an aromatic series polycarbonate as a result of inquiring wholeheartedly that the above-mentioned object should be attained was used as at least one layer.

[0008] Namely, this invention is a multilayer sheet which comes to carry out the laminating of the sheet beyond (1) 2 sheet. It is the sheet A with which at least one of them consists of one sort or two sorts or more of thermoplastics chosen from amorphism (A-1) polyester and (A-2) an aromatic series polycarbonate. Moreover, 150 degrees C in three directions which at least one layer divided equally in the sheet surface, The multilayer sheet characterized by being the sheet B with which the average of the rate of a heat shrink at the time of heat-treating for 30 minutes consists of a biaxial orientation sheet which is 1% or less, (2) Said sheet A receives a total of 100 weight sections of the

thermoplastics in this sheet. A multilayer sheet given in the above (1) characterized by coming to blend the inorganic tabular filler 0.5 whose mean particle diameter is 0.5-20 micrometers furthermore (a-1) - 25 weight sections, (3) A multilayer sheet given in the above (2) characterized by the aforementioned (a-1) component being one or more sorts chosen from talc and a kaolin, (4) The dicarboxylic acid unit in which the aforementioned (A-1) amorphism polyester component is mainly concerned with a terephthalic-acid unit, Above-mentioned (1) - (3) characterized by being amorphism polyester which consists of a glycol unit which is mainly concerned with ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit either The multilayer sheet of a publication, (5) A multilayer sheet given in the above (4) characterized by the mole ratio [(I)/(II)] of the ethylene glycol unit (I) in the aforementioned (A-1) amorphism polyester component and 1 and 4-cyclohexane dimethanol unit (II) being one or more, (6) The mole ratio [(I)/(II)] of an ethylene glycol (A-1-1) unit (I) and 1 and 4-cyclohexane dimethanol unit (II) One or more amorphism polyester, [the thermoplastics which constitutes said sheet A] And (A-1-2) it is that with which the mole ratio [(I)/(II)] of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) blended less than one amorphism polyester (A-1) and an aromatic series polycarbonate (A-2). Above-mentioned (1) - (3) characterized by a certain thing either The multilayer sheet of a publication, (7) An antenna circuit for said sheet B to send and receive a signal by the electromagnetic coupling or the electric wave on a sheet surface, and a conductor -- above-mentioned (1) - (6) characterized by forming a circuit -- either -- the multilayer sheet of a publication -- (8) Above-mentioned (1) - (7) characterized by the biaxial orientation sheet of Sheet B consisting of polyester is the multilayer sheet of a publication either. (9) Above-mentioned (1) - (7) characterized by the biaxial orientation sheet of Sheet B consisting of polyethylene terephthalate is the multilayer sheet of a publication either. (10) Above-mentioned (1) - (7) characterized by the biaxial orientation sheet of Sheet B being a polyethylene terephthalate sheet which formed the coat at least in the one side is the multilayer sheet of a publication either. Moreover, it is a card given in the above (11) characterized by being the card characterized by becoming any 1 term of - (10) from the multilayer sheet of a publication, (11) above-mentioned (1) (12) magnetic card, or an IC card.

[0009]

[Embodiment of the Invention] Below, the multilayer sheet and card of this invention are explained in full detail.

[0010] The multilayer sheet of this invention is a multilayer sheet which comes to carry out the laminating of the sheet of two or more sheets. It is the sheet A with which at least one of them consists of one sort or two sorts or more of thermoplastics chosen from amorphism (A-1) polyester and (A-2) an aromatic series polycarbonate. Moreover, it is characterized by being the sheet B with which the average with a rate [of a heat shrink] of 150 degrees C [in three directions which at least one layer divided equally in the sheet surface] consists of a biaxial orientation sheet which is 1% or less.

[0011] The amorphism polyester which is a component (A-1) in Sheet A in this invention points out the thing of the polyester whose amount of heat of crystallization when lowering the temperature the rate for 10-degree-C/from a melting condition with a differential scanning calorimeter is 5 or less cal/g. moreover, as an example of the amorphism polyester as a component (A-1) As a dicarboxylic acid component, a terephthalic acid, isophthalic acid, an alt.phthalic acid, 2, 6-naphthalene dicarboxylic acid,

2, 7-naphthalene dicarboxylic acid, 1, 5-naphthalene dicarboxylic acid, methyl terephthalic-acid, 4, and 4'-biphenyl dicarboxylic acid, - biphenyl dicarboxylic acid, and 2 and 2 '1, 2'-bis(4-carboxy phenoxy)-ethane, Succinic-acid, adipic-acid, suberic-acid, azelaic-acid, sebacic-acid, dodecane dione acid, OKUTA decane dicarboxylic acid, dimer acid and 1, and 4-cyclohexane dicarboxylic acid etc. is used. As a glycol component Ethylene glycol, propylene glycol, butanediol, 1,5-pentanediol, 1,6-hexanediol, 1, 8-octanediol, 1, 10-Deccan diol, The polymer and copolymer which carried out the polymerization using the 1, 4-cyclohexane dimethanol, 1, 3-cyclohexane dimethanol, 1, 2-cyclohexane dimethanol and 2, and 2-bis(2'-hydroxy ethoxy phenyl) propane etc. are mentioned.

[0012] The amorphism polyester (1 and 4-cyclohexane dimethanol derivative copolymerized polyester may be called hereafter) which consists of a dicarboxylic acid unit which is mainly concerned with a terephthalic-acid unit, and a glycol unit which is mainly concerned with ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit especially is desirable, and the amorphism polyester whose mole ratio [(I)/(II)] of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) is one or more is especially suitable.

[0013] (A-1) As amorphism polyester of a component Two or more kinds of amorphism polyester may be blended and used. In this case The mole ratio [(I)/(II)] of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) One or more amorphism polyester, And it is desirable that the mole ratio [(I)/(II)] of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) blends and uses less than one amorphism polyester from the point especially whose thermal resistance improves.

[0014] Although there is especially no limit in the upper limit of the above-mentioned mole ratio [(I)/(II)] here when the mole ratio [(I)/(II)] of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) uses one or more amorphism polyester, it is desirable that it is 99 or less. Moreover, although there is especially no limit in the minimum when the mole ratio [(I)/(II)] of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) uses less than one amorphism polyester, it is desirable to exceed 1/99.

[0015] The mole ratio [(I)/(II)] of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) Furthermore, one or more polyester, And the mole ratio [(I)/(II)] of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) blends less than one amorphism polyester. The desirable blending ratio of coal in the case of using it (weight ratio) (for a mole ratio [(I)/(II)]), one or more amorphism polyester / mole ratios [(I)/(II)] are less than one amorphism polyester) 5 / 95 - 95/5 -- it is preferably desirable 30 / 70 - 90/10, and that it is the range of 40 / 60 - 80/20 especially preferably.

[0016] Although especially the manufacture approach of 1 and 4-cyclohexane dimethanol derivative copolymerized polyester used as the above-mentioned (A-1) component is not limited, the approach of carrying out the polycondensation of a terephthalic acid or its low-grade alkyl ester, and 1 and 4-cyclohexane dimethanol and ethylene glycol to the bottom of existence of the catalyst of an organic titanium compound etc. or nonexistence is mentioned, for example. As polymerization conditions in this case, the conditions indicated by the U.S. Pat. No. 2,901,466 description, for example may be applied.

[0017] (A-1) To 1 and 4-cyclohexane dimethanol derivative copolymerized polyester used as a component It is the range not more than 10 mol % preferably. the range which

does not spoil the effectiveness of this invention -- usually -- less than [20 mol %] -- As an acid component, isophthalic acid, an alt.phthalic acid, 2, 6-naphthalene dicarboxylic acid, 2, 7-naphthalene dicarboxylic acid, 1, 5-naphthalene dicarboxylic acid, - biphenyl dicarboxylic acid, and methyl terephthalic-acid, 4, and 4 '2, 2'-biphenyl dicarboxylic acid, 1, 2'-bis(4-carboxy phenoxy)-ethane, a succinic acid, An adipic acid, a suberic acid, an azelaic acid, a sebacic acid, a dodecane dione acid, Other dicarboxylic acid, such as OKUTA decane dicarboxylic acid, dimer acid and 1, and 4-cyclohexane dicarboxylic acid As a glycol component, moreover, propylene glycol, 1,5-pentanediol, 1,6-hexanediol, 1, 8-octanediol, 1, 10-Deccan diol, Other glycols, such as a 1, 3-cyclohexane dimethanol, 1, 2-cyclohexane dimethanol and 2, and 2-bis(2'-hydroxy ethoxy phenyl) propane, can be copolymerized.

[0018] In this invention as an aromatic series polycarbonate of the component (A-2) in Sheet A A bisphenol A, 2 [i.e.,], and 2'-bis(4-hydroxyphenyl) propane, - dihydroxydiphenyl alkane, or 4 and 4 '4, 4'-dihydroxy diphenylsulfone, That by which 4 and the thing which uses as the main raw material one or more sorts chosen from 4'-dihydroxy diphenyl ether were preferably mentioned, and was manufactured especially considering bisphenol A, 2 [i.e.,], and a 2'-bis(4-hydroxyphenyl) propane as a main raw material is desirable. Specifically, it is desirable that it is the polycarbonate obtained by the ester interchange method or the phosgene method, using above-mentioned bisphenol A etc. as a dihydroxy component. Furthermore, a part of bisphenol A and the thing which permuted less than [10 mol %] preferably with - dihydroxy diphenylsulfone, and 4 and 4'-dihydroxydiphenyl alkane or 4, and 4 '4, 4'-dihydroxy diphenyl ether etc. are also used preferably.

[0019] Although the thermoplastics component in the sheet A of this invention may consist of any of component (A-1) independence, component (A-2) independence, and (A-1) both the components of a component and a component (A-2), it is desirable from the point of heat-resistant improvement that both a component (A-1) and a component (A-2) are included. (A-1) Although there is especially no definition in the blending ratio of coal of a component and a component (A-2) and the rate of arbitration is used, weight ratio (A-1)/(A-2) with desirable component (A-1) and component (A-2) is 95/5-5/95, and is 80 / 20 - 20/80 still more preferably.

[0020] In this invention, it is desirable to blend the inorganic tabular filler as a component (a-1) to the thermoplastics or the thermoplastics constituent which forms Sheet A from the point which raises embossing nature further. (a-1) As an inorganic tabular filler of a component, it is the so-called tabular inorganic filler, and the filler in which particle shape has a biaxial stacking tendency by the anisotropy in three dimensions is desirable. Talc, a kaolin, a mica, clay, a bentonite, a sericite, basic magnesium carbonate, an aluminum hydroxide, a glass flake, etc. are mentioned, and, specifically, two or more kinds of these fillers may be used together. In these, talc and a kaolin are desirable, and talc is the most desirable especially.

[0021] The range of 0.5 - 25 weight section is desirable to a total of 100 weight sections of the thermoplastics which forms Sheet A, or a thermoplastics constituent, especially, the addition of an inorganic tabular filler has the desirable range of 2 - 20 weight section, and its range of further 4 - 18 weight sections is desirable. If it is this range, a moldability will be good and the multilayer sheet and card with a high improvement effect of embossing nature will be obtained.

[0022] As for the mean particle diameter of an inorganic tabular filler, it is desirable that it is 0.5-20 micrometers in the phase after combination, and it is more desirable that it is 1-10 micrometers especially. The moldability to a multilayer sheet and a card is good in it being this range, and effectiveness with the good improvement effect of embossing nature is acquired. For that purpose, it is desirable to use the inorganic tabular bulking agent which has the mean particle diameter of 0.5-20 micrometers.

[0023] It can ask for the mean particle diameter of this inorganic tabular filler by measuring 50% o'clock of particle diameter of rates of accumulation by the Andreasen pipette method with a centrifugation type particle-size-distribution measuring device. In addition, in measuring the mean particle diameter of the inorganic bulking agent after combination, the multilayer sheet of this invention is burned with processing or an electric furnace by the organic solvent, only an inorganic tabular filler component is separated, and it presents measurement.

[0024] Moreover, surface treatment of these inorganic tabular fillers may be carried out by coupling agents, such as an isocyanate system compound, an organic silane system compound, an organic titanate compound, an organic borane system compound, and an epoxy compound.

[0025] In this invention, it is desirable to blend an antistatic agent to the thermoplastics or the thermoplastics constituent which forms Sheet A from the point which prevents adhesion of dust, the failure at the time of the handling by static electricity, etc. It is possible to use the antistatic agent of the common surfactant mold used for thermoplastics as an antistatic agent. A non-ion system, an anion system, a cation system, a both-sexes system, etc. are specifically mentioned, and it is possible from these antistatic agents one sort or to use two or more sorts. Moreover, although the antistatic agent of an anion system is preferably used also in an antistatic agent, and a sulfonate mold anion system antistatic agent is mentioned as an antistatic agent of an anion system, for example, there are an alkyl sulfonic-acid metal salt, an alkyl aromatic series sulfonic-acid metal salt, etc., an alkyl sulfonic-acid metal salt is preferably excellent in the field of antistatic nature or embossing nature. If the example of an alkyl sulfonic-acid metal salt is given, it will be the alkali-metal salt or alkaline-earth-metal salt of an aliphatic series sulfonic acid of an alkyl group, and the carbon numbers of a desirable alkyl group will be 8-22. [of carbon numbers 1-35] As an alkali metal, sodium, a potassium, etc. are mentioned and calcium, barium, magnesium, etc. are mentioned as an alkaline earth metal. As a concrete compound of an alkyl sulfonic-acid metal salt, there are n-hexyl sulfonic-acid soda, n-heptyl sulfonic-acid soda, n-octyl sulfonic-acid soda, n-nonyl sulfonic-acid soda, n-DESHIRU sulfonic-acid soda, n-dodecyl sulfonic-acid soda, n-tetradecyl sulfonic-acid soda, n-hexadecyl sulfonic-acid soda, n-heptadecyl sulfonic-acid soda, n-octadecyl sulfonic-acid soda, etc. an antistatic agent -- an addition -- being few -- elapsing -- if -- being enough -- antistatic -- a sex -- grant -- effectiveness -- obtaining -- not having -- reverse -- many -- elapsing -- if -- thermoplastics -- thermal stability -- spoiling -- an inclination -- it is -- a sake -- a sheet -- A -- thermoplastics -- the total quantity -- it is (A-1) -- a component -- (-- A - two --) -- a component -- a total -- 100 -- weight -- the section -- receiving -- 0.02 - 10 weight section -- desirable -- inside -- 0.03 - 7 weight section and further 0.05 - 5 weight sections -- more -- being desirable .

[0026] In addition, if it is the range which does not spoil the object of this invention to the thermoplastics in the sheet A which forms the multilayer sheet of this invention, other

additives of various kinds of can also be blended further. As an additive besides these, for example A glass fiber, a carbon fiber, an asbestos fiber, Non-tabular fillers, such as rock wool, a calcium carbonate, silica sand, a barium sulfate, and a glass bead, Antioxidants (the Lynn system, sulfur system, etc.), an ultraviolet ray absorbent, a thermostabilizer (hindered phenol system etc.), The coloring agent containing lubricant, a release agent, a slipping amelioration agent, an antiblocking agent, a color, and a pigment, Flame retarders (a halogen system, Lynn system, etc.), fire-resistant assistants (the antimony compound represented by the antimony trioxide, a zirconium dioxide, molybdenum oxide, etc.), a foaming agent, cross linking agents (for example, the epoxy compound of many **, an isocyanate compound, an acid anhydride, etc.), etc. are mentioned. Moreover, other synthetic resin (for example, polyamide resin, polyethylene resin, ethylene / vinyl acetate copolymer, phenoxy resin, an epoxy resin, silicone resin, etc.) can also be made to contain.

[0027] The sheet B in this invention needs to be the sheet B with which the average of the rate of a heat shrink at the time of heat-treating 150 degrees C for 30 minutes in three directions equally divided in the sheet surface consists of a biaxial orientation sheet which is 1% or less. Moreover, as for this rate of a heat shrink, it is more desirable that it is 0.3% or less, and it is more desirable. [0.1 more% or less of] Although Sheet B has the desirable one where the rate of a heat shrink is smaller in all directions in this invention, with [the rate of a heat shrink] the above [below], the dimensional change at the time of a heating laminating is small, and does not need hot melt adhesive as the result, but thermal melting arrival nature with the above-mentioned sheet A also discovers **.

[0028] A biaxial orientation sheet means the sheet which extended in the longitudinal direction, and a longitudinal direction and a right-angled direction (cross direction) here. It is semantics although the thing extended to a longitudinal direction after extending melting extrusion, the thing extended crosswise after extending a-less orientation sheet to a longitudinal direction, and crosswise or the longitudinal direction, the thing to extend to crosswise coincidence and the drawing of a longitudinal direction, and the crosswise drawing were specifically combined two or more times substantially. Moreover, the direction which calls a direction parallel to the sheet surface direction "the direction of [in a sheet surface]", and crosses in the sheet surface direction is semantics to remove. In addition, in this invention, the average in three directions divides 360 degrees into six equally, measures them to three directions shifted by a unit of 60 degrees from the core, and points out the average of the three values.

[0029] The manufacturing method of the sheet which has such a rate of a heat shrink The approach of heat-treating, while setting both the shafts of a longitudinal direction and the cross direction as a big relaxation after simultaneous biaxial stretching although there is especially no limit, The approach of carrying out long duration heat treatment of the sheet which has the high rate of a heat shrink of high orientation, such as a biaxial-stretching method, serially by the sheet roll condition or the judged sheet-like voice in the temperature requirement of ($T_g + 100$ degree C) from temperature ($T_g - 30$ degree C) lower 30 degrees C than the glass transition temperature T_g of the macromolecule etc. is effective.

[0030] As thermoplastics suitable for being used for the sheet B of this invention for biaxial orientation sheets, it is represented with polyester, polyolefine, a polyamide, a

polyether, a polyphenylene sulfide (PPS), a polyacrylonitrile, a polycarbonate, etc., and polyester is desirable especially. Polyester is a compound which has an ester bond in a macromolecule principal chain. Specifically Polyethylene terephthalate (PET), polybutylene terephthalate (PBT), Polyethylene -2, 6-naphthalate (PEN), polytrimethylene terphthalate (PPT), As polyethylene-p-oxybenzoate (POB), Polly 1, 4-cyclo hexylene dimethylene terephthalate (PCT), and a copolymerization component For example, diol components, such as ethylene glycol, neopentyl glycol, and a polyalkylene glycol, It is polyester resin which copolymerized dicarboxylic acid components, such as adipic-acid, sebacic acid, phthalic-acid, isophthalic acid, 2, and 6-naphthalene dicarboxylic acid, etc. Especially the homopolymers and those copolymers of Polly 1, 4-cyclo hexylene dimethylene terephthalate (PCT), polytrimethylene terphthalate (PPT), or polyethylene terephthalate (PET) are desirable especially. Especially the homopolymer of polyethylene terephthalate (PET) is desirable. Moreover, although it is the polyalkylene glycol (PAG) represented with polyoxymethylene (POM) or a polyethylene glycol (PEG) as a polyether, even if it is not these homopolymers, the polyester ether which is a copolymer with polyester, such as PET, PBT, and PEN, is sufficient.

[0031] In addition, if it is the range which does not spoil the object of this invention to the thermoplastics in the sheet B which forms the multilayer sheet of this invention, other additives of various kinds of can also be blended further. As an additive besides these, for example A glass fiber, a carbon fiber, an asbestos fiber, Non-tabular fillers, such as rock wool, a calcium carbonate, silica sand, a barium sulfate, and a glass bead, An antistatic agent, a crystalline-nucleus agent, an adhesiveness-reducing agent, an antioxidant (the Lynn system, sulfur system, etc.), An ultraviolet ray absorbent, thermostabilizers (hindered phenol system etc.), lubricant, a release agent, the coloring agent containing a slipping amelioration agent, an antiblocking agent, a color, and a pigment, and a flame retarder (a halogen system --) Fire-resistant assistants (the antimony compound represented by the antimony trioxide, a zirconium dioxide, molybdenum oxide, etc.), such as the Lynn system, a foaming agent, cross linking agents (for example, the epoxy compound of many **, an isocyanate compound, an acid anhydride, etc.), etc. are mentioned. Moreover, other synthetic resin (for example, polyamide resin, polyethylene resin, ethylene / vinyl acetate copolymer, phenoxy resin, an epoxy resin, silicone resin, etc.) can also be made to contain. Especially an inorganic particle and an organic particle are effective in order to give smoothability to a film front face and to raise the handling nature of a film. As a typical additive, a silicon dioxide, an alumina, a calcium carbonate, a zirconium dioxide, talc, a kaolin, a clip, a barium sulfate, titanium oxide, bridge formation polystyrene resin, bridge formation polyester resin, those mixtures, etc. can be used. Moreover, as for this sheet B, it is also desirable to have taken laminated structures, such as surface conversion. As a laminated structure, the laminating by the co-extrusion, the laminating by spreading, etc. are employable. These laminated structures are mainly performed in order to give the surface characteristic according to the application. Especially in the case of this invention, grant of various properties, such as improvement in the welding nature at the time of a heating laminating and the easy adhesiveness of the printing ink to a front face, and antistatic nature that stops static electricity, is possible.

[0032] In order to obtain the thermal melting arrival nature which was excellent in this sheet B with the time of a heating laminating, it is desirable to form a coat at least in one side. As resin which constitutes the coat formed on the surface of a sheet, although

polyester resin, acrylic resin, etc. are mentioned, it is desirable that polyester resin is included from the point of thermal melting arrival nature especially, and it is desirable that polyester resin and a melamine system compound are included further.

[0033] The polyester resin which constitutes this coat has the ester bond which becomes a principal chain or a side chain from an acid component and a glycol component, and can choose it as arbitration from well-known polyester resin conventionally.

[0034] The dicarboxylic acid which comes to contain the sulfonic group represented by a sulfo terephthalic acid, 5-sulfoisophtharic acid, 2-sulfoisophtharic acid, 4-sulfoisophtharic acid, 4-sulfo naphthalene-2,6-dicarboxylic acid, etc. from an adhesive point as an acid component which carries out an ester bond in the polyester resin which constitutes a coat is desirable. As for the content of a sulfonic group, it is desirable that it is less than [0.5 mol %]. As a carboxylic acid component which does not contain a sulfone radical, the dicarboxylic acid of aromatic series, aliphatic series, and an alicyclic group and the multiple-valued carboxylic acid more than trivalent can be used. As aromatic series dicarboxylic acid, terephthalic acid, isophthalic acid, orthochromatic phthalic acid, 2,6-naphthalene dicarboxylic acid etc. can be mentioned. These aromatic series dicarboxylic acid -- more than 30 mol % of all dicarboxylic acid components -- desirable -- more than 35 mol % -- more than 40 mol % is more preferably desirable. As dicarboxylic acid of **** and an alicyclic group, succinic acid, adipic acid, sebacic acid, dodecane dione acid, dimer acid, 1,3-cyclopentane dicarboxylic acid, 1,2-cyclohexane dicarboxylic acid, 1,4-cyclohexane dicarboxylic acid etc. is mentioned. As a multiple-valued carboxylic acid, for example Trimellitic acid, trimellitic anhydride, Pyromellitic acid, pyromellitic dianhydride, 4-methyl cyclohexene-1,2,3-tricarboxylic acid, Trimesic acid, 1,2,3,4-butane tetracarboxylic acid, 1,2,3,4-pentane tetracarboxylic acid, 3,3',4,4'-benzophenone tetracarboxylic acid, the 5-(2,5-dioxo tetrahydrofurfuryl)-3-methyl-3-cyclohexene-1,2-dicarboxylic acid, The 5-(2,5-dioxo tetrahydrofurfuryl)-3-cyclohexene-1,2-dicarboxylic acid, Cyclopentane tetracarboxylic acid, 2,3,6,7-naphthalene tetracarboxylic acid, 1,2,5,6-naphthalene tetracarboxylic acid, ethylene-glycol-bis(trimellitate), 2,2',3,3'-diphenyl tetracarboxylic acid, thiophene-2,3,4,5-tetracarboxylic acid, ethylene tetracarboxylic acid, etc. are mentioned. Especially, trimellitic acid, pyromellitic acid, the 5-(2,5-dioxo tetrahydrofurfuryl)-3-methyl-3-cyclohexene-1,2-dicarboxylic acid, etc. are used preferably. Inside -- a TORIMETTO acid -- adhesion, water-dispersion, and aqueous -- from points, such as volatility and thermal resistance, -- desirable -- the inside of polyester resin -- one-mol % - 25-mol % -- what is contained is desirable.

[0035] moreover, as a glycol component which carries out an ester bond in the polyester resin which constitutes a coat Ethylene glycol, a diethylene glycol, a polyethylene glycol, Propylene glycol, a polypropylene glycol, 1,3-propanediol, 1,3-butanediol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, The 1,9-nonanediol, 1,10-Decanediol, 2,2,4,4-dimethyl-2-ethyl hexane-1,3-diol, Neopentyl glycol, 2-ethyl-2-butyl-1,3-propanediol, 2-ethyl-2-isobutyl-1,3-propanediol, 3-methyl-1,5-pentanediol, 2,2,4-trimethyl-1,6-hexanediol, 1,2-cyclohexane dimethanol, 1,3-cyclohexane dimethanol, 1,4-cyclohexane dimethanol, 2,2,4,4-tetramethyl-1,3-cyclobutane diol, 4,4'-thiodiphenol, Bisphenol A, 4,4'-methylene diphenol, 4,4'-(2-NORUBORONIDEN) diphenol, 4,4'-dihydroxy biphenol, o-, m-, and p-dihydroxybenzene, 4,4'-isopropylidene phenol, 4,4'-isopropylidene bottle diol, a

cyclopentane -1, 2-diol, a cyclohexane -1, 2-diol, a cyclohexane -1, 4-diol, etc. are mentioned.

[0036] As an example of the above-mentioned polyester resin, the polyester resin which comes to copolymerize ethylene glycol, neopentyl glycol, and 1,4-butanediol as an acid component as a terephthalic acid, isophthalic acid, trimellitic acid, a sebacic acid, and a glycolic acid is mentioned preferably.

[0037] Moreover, the glass transition temperature of the polyester resin which forms a coat has a ductile point to desirable 0-80 degrees C of thermal resistance and a coat.

[0038] As for this polyester resin, it is desirable among a coat constituent to be contained 80% of the weight or more more preferably 60% of the weight or more.

[0039] Moreover, the compounds which lower alcohol was made to react to the methylol-ized melamine derivative and methylol-ized melamine which are obtained by condensing a melamine, a melamine, and formaldehyde as a melamine system compound which constitutes a coat, and were etherified selectively or thoroughly, and such mixture are mentioned. Moreover, any of the condensate which consists of a polymer more than a monomer and a dimer as melamine resin are sufficient, and such mixture is sufficient. Although methyl alcohol, ethyl alcohol, isopropyl alcohol, n-butanol, isobutanol, etc. can be mentioned as lower alcohol used for etherification, it does not limit especially.

Furthermore, although the compound which etherified the methylol-ized melamine derivative selectively from points, such as water solubility, reactivity, shelf life, and moisture resistance, and its mixture are desirable, it does not limit especially.

[0040] As for this melamine system compound, it is desirable among a coat constituent to be contained 0.05 to 20% of the weight more preferably 0.01 to 30% of the weight.

[0041] Moreover, although polyester resin and a melamine system compound are mixed and can be applied by the ratio of arbitration with polyester resin and a melamine system compound when it constitutes a coat, preferably, in the weight ratio of polyester resin / melamine system compound, 99 / 1 - 60/40 are desirable, and are 99 / 1 - 90/10 preferably [it is more desirable and] to 99 / 1 - 80/20, and a pan. Moreover, in this case, about a part or all, polyester resin and a melamine system compound may react and do not need to react.

[0042] As the formation approach of this coat, the approaches (solvents other than a compound fusion extrusion method, the hot melt coat method, and water, water solubility and/or the in-line coat method from water-dispersion resin, the off-line coat method, etc.) of covering resin on a front face, the surface area layer method which is a presentation or its blend article similarly are mentioned. Especially, the in-line coat method and the off-line coat method are preferably used from the point on uniform coat formation or industry. Although this in-line coat method and the off-line coat method can be performed according to a well-known approach and it is not limited especially, it is desirable from the point of adhesion to perform surface treatment, such as corona discharge treatment, before spreading.

[0043] As the concrete approach of this in-line coat approach, before orientation is completed, the coat raw material content solution adjusted to the specified quantity is applied on a sheet, and the approach of performing desiccation, drawing, and heat treatment and making it complete, i.e., the approach of forming in a biaxial orientation sheet production process, is mentioned. When forming a coat by this approach, it is desirable to use advantageous aqueous resin in respect of the explosion protection nature

of equipment, environmental pollution, etc., and, also as for the above-mentioned resin, it is desirable to use water solubility and/or water-dispersion resin. A water-soluble organic compound, a surfactant, etc. may be used together to water solubility and/or water-dispersion resin, and if conventionally manufactured by the well-known approach, it can be used for arbitration.

[0044] Moreover, as the concrete approach of the off-line coat approach, biaxial stretching of the sheet is beforehand carried out within the production process, and the approach of drying, after applying the coat raw material content solution subsequently to the specified quantity adjusted, the method of establishing the process of spreading-desiccation, after rolling round a sheet as single film, etc. are mentioned. Said coat raw material content solution to apply is used in the form of an organic solvent solution where an organic solvent, for example, an alcoholic system, a carboxylate system, a ketone system, an aliphatic hydrocarbon system, alicyclic or aromatic hydrocarbon systems, and such mixed stock were used.

[0045] Although especially the method of application is not limited but the extrusion laminating method, a melt coating method, etc. may be used, since it says that it is possible to carry out a thin film coat at high speed, well-known approaches, such as the gravure coat method, the reverse coat method, the kiss coat method, the die coat method, and the meta-ring bar coat method, are applicable. Moreover, although coating material concentration and especially paint film desiccation conditions are not limited, it is desirable to carry out in the range which does not have an adverse effect on many properties of a coat layer or a base material sheet.

[0046] It is usually preferably desirable [especially preferably] 0.01 micrometers or more 0.1 micrometers or less, although especially the thickness of this coat is not limited that it is [0.02 micrometer or more] 0.07 micrometers or less still more preferably 0.005 micrometers or more 0.3 micrometers or less 0.001 micrometers or more 1 micrometer or less.

[0047] the antenna circuit for sending and receiving a signal by the electromagnetic coupling or the electric wave, when using the multilayer sheet which comes to carry out the laminating of said sheet A and the sheet B as an IC card application, and a conductor -- it is desirable from the point of the ease of manufacture to form a circuit on the field of Sheet B.

[0048] The approach of sticking, etching and forming the foil of copper or aluminum on a sheet as the formation approach of the above-mentioned antenna circuit, and that a cross section is circular, or the approach of sticking the coil coil which coiled a rectangular (ellipse) copper wire etc. around the curled form and the approach of forming conductive paste by silk screen printing are mentioned.

[0049] moreover, a conductor -- the approach of piercing a metallic thin plate like TAB in a need configuration as the formation approach of a circuit -- or a metallic foil is stuck like an antenna circuit on a sheet, and the approach of carrying out etching processing of this and the approach of carrying out circuit formation like an antenna circuit by printing are mentioned.

[0050] moreover, the above-mentioned antenna circuit and a conductor -- it can use combining the formation approach of a circuit. among these, the antenna circuit by etching and a conductor -- the conductor by the circuit and etching -- a circuit, a coil coil and the antenna circuit by printing, and a conductor -- a circuit, the antenna circuit by the

TAB method, and a conductor -- the conductor by the circuit and the TAB method -- five sorts of a circuit and a coil coil are the combination of the manufacture generally used.

[0051] Moreover, although the laminating gestalt of the multilayer sheet of this invention is a multilayer sheet which comes to carry out the laminating of the sheet of two or more sheets, in order to heighten the effectiveness of the above-mentioned embossing nature more, it is desirable [a gestalt] that consider as the multilayer sheet which comes to carry out the laminating of the sheet of three or more sheets, and two-layer [of a surface layer] is formed with the above-mentioned sheet A. And in this invention, at least, especially when thermal melting arrival of much more sheet A and the sheet B much more at least is carried out, it is desirable at the point that the effectiveness can be demonstrated.

[0052] The structure which carried out the laminating of the sheet A to one side of the antenna time road side of Sheet B as an example of the above-mentioned laminating gestalt, The structure which carried out the laminating of the sheet A to the reverse side of the antenna time road side of Sheet B, the structure which carried out the laminating of the sheet A to the both sides of Sheet B, The structure which carried out the two or more sheet laminating of the sheet B in the form which sandwiches an antenna circuit, and carried out the laminating of the sheet A to the both sides, The structure which carried out the two or more sheet laminating of the sheet B in the form which sandwiches an antenna circuit, and carried out the two or more sheet laminating of the sheet A to the both sides, The two or more sheet laminating of the sheet B is carried out so that it may become the outside of a layer where an antenna circuit consists of a sheet B. The structure which carried out the two or more sheet laminating of the sheet B so that it might become the outside of a layer where the structure which carried out the laminating of the sheet A to the both sides, and an antenna circuit consist of a sheet B, and carried out the two or more sheet laminating of the sheet A to the both sides, the multilayer structure which carried out the two or more sheet laminating of the sheet A to the both sides of Sheet B are mentioned.

[0053] Moreover, the sheet C which becomes extent which does not spoil effectiveness from thermoplastics constituents other than the above-mentioned sheet A and Sheet B further can also be used. As an example of the thermoplastics used for Sheet C, polyolefines, such as polyamides, such as nylon 6 and Nylon 66, polyethylene, and polypropylene, cellulose triacetate, a polyphenylene sulfide, polyimide, polyamidoimide, etc. are mentioned.

[0054] Moreover, it is desirable from the point of the embossing disposition top effectiveness that the rate of Sheet A accounts for at least 50% or more of rate by thickness to the whole multilayer sheet of this invention, and it is desirable to account for 70 more% or more of rate. Moreover, between each sheet layer, you may print if needed and the magnetic substance may be applied. This magnetic layer may be the whole sheet surface, or may be some sheets, such as the shape of a stripe. After obtaining this multilayer sheet furthermore, of course, it is also possible to ornament printing, a coat, etc. on a front face.

[0055] Moreover, the effectiveness of the multilayer sheet of this invention being a multilayer sheet which comes to carry out the laminating of the above-mentioned sheet A and the above-mentioned sheet B, and good thermal melting arrival nature being shown in the combination of the thermoplastics constituent which constitutes the sheet shown

above at the time of a heating laminating, and excelling in embossing nature shows up.

[0056] Although especially the laminating approach of the multilayer sheet of this invention does not have a limit and the approach of common knowledge of arbitration, such as the co-extruding method, a heating laminated layers method, and the hot melt method, is used, a heating laminated layers method is usually used well especially.

[0057] Especially although especially the thickness of each class which constitutes the multilayer sheet of this invention is not limited, it is desirable that a surface layer is the thickness layers other than about 50 micrometers - 100 micrometers and a surface layer are [about 100 micrometers - 700 micrometers and 150 micrometers - 2000 micrometers of whose whole] 600 micrometers - 900 micrometers.

[0058] Although especially the manufacture approach of the card which consists of a multilayer sheet of this invention is not limited, the multilayer sheet of this invention is cut in specific magnitude, and the approach of processing it into a card is mentioned. Moreover, fabricating, such as press forming, may be performed to the above-mentioned multilayer sheet, and you may process it in the shape of a card type.

[0059] Although especially the magnitude of the card which consists of a multilayer sheet of this invention is not limited, the thing of a rectangle configuration with the breadth whose long side is 10mm - 300mm and whose shorter side is 10mm - 200mm is desirable, and the thing of a rectangle configuration with the breadth whose long side is especially 50mm - 100mm and whose shorter side is 25mm - 80mm is desirable. The thing of the rectangle configuration whose long side is about 85mm and whose shorter side is about 54mm especially is more desirable.

[0060] When using for the card of JISX6301 conformity of a magnetic card, an IC card, etc. the card which consists of a multilayer sheet of this invention, to a total of 100 weight sections of the thermoplastics which constitutes the multilayer sheet of this invention if needed, or a thermoplastics constituent, titanium oxide 2 - 25 weight sections are added, and it is used, making it opaque. Moreover, as for addition of this titanium oxide, it is desirable to add in a inner layer also from the point that the thermal melting arrival effectiveness of having excelled more besides the effectiveness of making a sheet opaque and concealing a circuit base material can be acquired.

[0061] Since there are few amounts of curvatures at the time of embossing, it excels in the embossing nature of a crack not arising on a marking alphabetic character front face and it excels in the thermal melting arrival nature at the time of a heating laminating, the multilayer sheet of this invention can be suitably used as a card application.

[0062] the card which can generally record the information on a magnetic card, an IC card, etc. as an application of the card which consists of a multilayer sheet of invention -- magnetic and specifically electric -- or -- optical -- reading -- and/or -- writing -- a possible card application -- a prepaid card, a credit card, a banking card, the various cards for certification, the card for driver's licenses, etc. are more specifically mentioned, and it can be preferably used as these cards.

[0063]

[Example] Hereafter, an example is given and the configuration and effectiveness of this invention are explained further.

[0064] First, (A-1-1), amorphism (A-1-2) polyester, an aromatic series (A-2) polycarbonate, talc (a-1), and titanium oxide (a-2) were prepared as a sheet A.

[0065] A-1-1: Polyester whose mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and

4-cyclohexane dimethanol unit (II) it is polyester which consists of a terephthalic-acid unit and an ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit, and is about 70/30 (Eastman chemical company make "Easter" GN071).

A-1-2: Polyester whose mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) it is polyester which consists of a terephthalic-acid unit and an ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit, and is about 35/65 (Eastman chemical company make "Easter" DN003).

A-2: Aromatic series polycarbonate (the product made from Mitsubishi Engineering plastics "a you pyrone" S3000).

a-1: Talc (talc with a mean particle diameter of 1.4 micrometers, LMSmade from Fuji Talc Industry- 300)

a-2: Titanium oxide (titanium oxide of a rutile mold, KR[by Titan Kogyo K.K.]- 460).

[0066] After carrying out the dryblend of the raw material which consists of a compounding ratio of a publication to a table 1 and a table 2 using V blender, the biaxial screw extruder was supplied at 250 degrees C, and discharge, the thickness of 100 micrometers, and a 250-micrometer sheet (a sheet A1 - sheet A6) were obtained from the T die.

[0067] Next, as a sheet B, the thickness of 100 micrometers and a 250-micrometer sheet (sheet B1) were obtained in the manufacturing method shown below. In addition, a circle with a diameter of 50mm is drawn on the sample sampled in width of face of 50mm, and die length of 50mm, and measurement of the rate of a heat shrink draws the straight line which passes along a core in the direction which divided 360 degrees of a field into six, and shifted them 60 degrees at a time, it measures the die length (diameter of circle) of the straight line which crosses with a circle with an omnipotent projector, and is set to L0 (mm). In this example, one of these straight lines was made into the direction of parallel to the longitudinal direction of a sheet. Next, after holding this sample for 30 minutes in the hot blast oven heated by 150 degrees C and cooling at a room temperature after that for 2 hours, again, linear spacing is measured to accuracy with an omnipotent projector, and it is referred to as L (mm). It considered as rate =of heat shrink $[(L_0-L)/L_0] \times 100(\%)$ from this measurement result. The rate of a heat shrink was computed by having averaged the rate of a heat shrink computed about each straight line.

[0068] After carrying out the vacuum drying of the pellet of the polyethylene terephthalate (Tg:69 degree C) of sheet B1 limiting viscosity 0.65 at 180 degrees C for 5 hours, the extruder heated by 280 degrees C was supplied and it fabricated in the shape of a sheet from the T die. Furthermore, the non-extended sheet which carried out adhesion solidification of this sheet by electrostatic force at cooling drum lifting with a skin temperature of 25 degrees C was obtained.

[0069] This non-extended sheet was heated by the 80-100-degree C heating roller group, the vertical drawing was carried out by the single step 3.3 times in the lengthwise direction, and it cooled by the 20-50-degree C roll group. Then, leading to a tenter and grasping the ends of this sheet with a clip Preheating in the hot blast ambient atmosphere heated by 90 degrees C, increasing a horizontal drawing 3.5 times in a longitudinal direction in a 95-degree C hot blast ambient atmosphere, performing heat treatment for 7 seconds at 250 degrees C in a tenter further, and cooling slowly to 100 degrees C after heat treatment The rail width of face of a tenter was contracted, crosswise, 5%, spacing of the clip of a tenter was contracted, 2% of relaxation processing was performed to the

longitudinal direction, it cooled to the room temperature, and drawing and the edge part of the both ends of a sheet were trimmed and rolled round from the tenter. Since sheet width of face was a 5m biaxial orientation sheet, the slit was carried out to 1m piece, and 100 micrometers in thickness and a 250-micrometer biaxial orientation sheet were obtained. The rate of a heat shrink of this biaxial orientation sheet was 0.04% by any thickness.

[0070] Like the sheet B-2 sheet B1, drawing and the edge part of the both ends of a sheet were trimmed and rolled round from the tenter, and the biaxial orientation sheet with a sheet width of face [of 5m] and a thickness of 100 micrometers was obtained. The slit of the sheet obtained in this way was carried out to 1m piece, and further, after carrying out a slit to 1m length at a longitudinal direction, annealing treatment was performed for 5 minutes in the hot blast oven heated by 150 degrees C. The rate of a heat shrink of this biaxial orientation sheet was 0.01%.

[0071] After extending crosswise in the tenter of sheet B3 sheet B1, clip grasping is once opened and it regrasped with a clip again, fixed-length heat treatment (0% of rates of relaxed) was performed, carrying out temperature up to 120-230 degrees C, and like the sheet B1, others trimmed and rolled round ejection and the edge part of the both ends of a sheet from the tenter, and obtained the biaxial orientation sheet with a sheet width of face [of 5m], and a thickness of 100 micrometers. The rate of a heat shrink of this biaxial orientation sheet was 1.5%.

[0072] After applying to a corona-discharge-treatment side side what used toluene/methyl ethyl ketone (mixing ratio 1:1) as the diluent solvent, and made the following polyester resin at this 10 % of the weight of concentration after carrying out corona discharge treatment on the thickness sheet front face of 100 micrometers obtained with the sheet B4 sheet B1 by the gravure coat method, it was made to dry for 1 minute at 120 degrees C, and the coat stratification sheet whose coat layer is 2.0 micrometers was obtained.

[Polyester resin]

- Polyester resin which is 29 mol % and seven mol [of isophthalic acid] % and ten mol [of trimellitic acid] % and three mol [of sebacic acids] % of terephthalic acids as an acid component, and comes to copolymerize ethylene glycol 14 mol %, neopentyl glycol 19 mol %, and 1,4-butanediol 18 mol % as a glycol component.

[0073] After applying to a corona-discharge-treatment side side what used toluene/methyl ethyl ketone (mixing ratio 1:1) as the diluent solvent, and made the following preparations at this 10 % of the weight of concentration after carrying out corona discharge treatment on the sheet front face obtained with the sheet B5 sheet B1 by the gravure coat method, it was made to dry for 1 minute at 120 degrees C, and the coat stratification sheet whose coat layer is 2.0 micrometers was obtained.

[0074] [Preparation presentation]

As an acid component, it is 29 mol % and seven mol [of isophthalic acid] % and ten mol [of trimellitic acid] % and three mol [of sebacic acids] % of terephthalic acids. - As a glycol component Ethylene glycol 14 mol %, neopentyl glycol 19 mol %, the polyester resin:85 weight section and N-methylol which comes to copolymerize 1,4-butanediol 18 mol % -- to a-izing melamine compound (NW)-12LF(Made in Sanwa chemical):15 weight section pan A press-forming machine is presented with each sheet (100 micrometers and the above-mentioned 250 micrometers) in piles with a configuration given in a table 3 and a table 4 in 100/250/100/250/100micrometer ("/" expresses a

laminating) order, respectively. After carrying out thermal melting arrival the condition for [temperature / of 130 degrees C /, pressure 1MPa, and holding-time] 10 minutes, the multilayer sheet was obtained by cooling the condition for [temperature / of 23 degrees C /, pressure 1MPa, and holding-time] 5 minutes. Furthermore, it is JIS from this multilayer sheet. The card of X6301 conformity was created.

[0075] As an index of embossing nature, use a manual system embosser (NEmade from Japanese ***** Co.- 1600) for the above-mentioned card, and an embossed character is stamped on it over three lines. It is JIS about the amount of card curvatures in that case. It measured according to X6301, and the marking alphabetic character was expanded by 20 times with the stereoscopic microscope, the existence of an alphabetic character crack was observed, and that from which O and an alphabetic character crack produced the thing without an alphabetic character crack was made into x.

[0076] As an index of thermal melting arrival nature, in the sheet which constitutes the above-mentioned multilayer sheet A press-forming machine is presented with a 100-micrometer sheet about the combination (only the example 1 of a comparison sheet of the same kind) of two sorts of different sheets. At 130 degrees C After holding for 10 minutes and carrying out thermal melting arrival by pressure 1MPa, the trial which pulls apart the above-mentioned card by hand was performed, and O, the thing which exfoliates in part, and the thing which exfoliates thoroughly were made into x for what cannot weld thoroughly and cannot be pulled apart. Moreover, the sample to which the above-mentioned thermal melting arrival temperature was changed at intervals of 5 degrees C among 100 degrees C - 150 degrees C was created, and the minimum temperature of the thermal melting arrival temperature which moist heat treatment cannot be performed for four days under 40-degree-C90%RH, and after moist heat treatment cannot weld this sample thoroughly, and cannot be pulled apart was written together.

[0077] These assessment results are written together to a table 3 and a table 4.


[0078]

[A table 1]

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[0079]

[A table 2]

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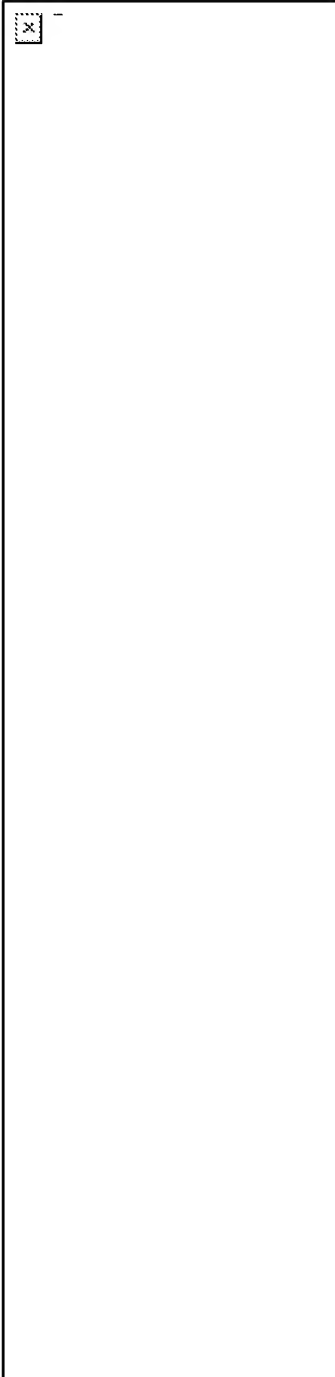
[0080]

[A table 3]

<div><div><div><div><div><div>×</div></div></div><div></div></div></div></div>

[0081]

[A table 4]



[0082] It turns out that it excels in the embossing nature of there being little curvature at the time of embossing, and a crack not producing the card which consists of a multilayer sheet of this invention from the result of a table 3, and it to a marking alphabetic character again, and ** is also excellent in the thermal melting arrival nature at the time of a heating laminating without hot melt adhesive. in addition -- an IC card application -- Sheet B top -- an antenna circuit and a conductor -- a circuit is formed and it is used.

[0083] Moreover, from the result of a table 4, by adding titanium oxide to a inner layer shows excelling by the thermal melting arrival nature at the time of a heating laminating.

[0084]

[Effect of the Invention] As explained above, the card which consists of a multilayer sheet of this invention and it is excellent in the embossing nature of there being little curvature at the time of embossing, and a crack not arising to a marking alphabetic character again, and is excellent in the thermal melting arrival nature at the time of a heating laminating, and is suitably used as a magnetic card, an IC card, etc.

[Translation done.]
